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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/685,042	10/10/2000	Shuichi Kobayashi	35.G2657	3110

5514 7590 11/15/2004

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EXAMINER	
CHANG, AUDREY Y	
ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/685,042	KOBAYASHI, SHUICHI	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,7,17,19 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4, 7, 17, 19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **September 3, 2004** has been entered.

2. This Office Action is also in response to applicant's amendment filed on September 3, 2004, which has been entered into the file.

3. By this amendment, the applicant has amended claims 1, 19 and 20, and has canceled claims 2-3, 5-6, 8-16, 18, and 21.

4. Claims 1, 4, 7, 17 and 19-20 remain pending in this application.

5. The rejections to claims 1 and 11 and their dependent claims under 35 USC, first paragraph, of newly added matters, set forth in the previous Office Action are withdrawn.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. **Claims 1, 4, 7, 17, and 19-20 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. .

Claim 1 has been amended to include the phrase "said first diffraction part and said second diffraction part *are configured* to reduce the incident angle of a ray of off-axis primary light which is incident on said second diffraction part". The specification and the claims **fail** to teach such **explicitly**. The specification fails to teach in particular how does the second diffraction grating is "*configured*" to have the angle of incident being reduced. Also there are more than one angles of incident on the second diffraction grating part depends on where the incident light strikes and the curvature of the second diffraction part. The specification fails to teach that **all** of the angles of incidence of the off-axis primary rays strike the second diffraction grating at any part has angle of incident reduced.

The specification and the claims fail to teach how could the first diffraction part *reduces* the incident angle of an off-axis primary ray incidents on second diffraction part. It is known in the art that the in general, an optical element with *positive* power will *converge* light ray toward the optical axis and an optical element with *negative* power will *diverge* light *away* from to the optical axis. The incident angle of light ray on an optical element depends on *direction* of the light ray travels and is *measured* with respect to the **surface normal** of the element, which therefore implicitly depends on the *curvature* of the element, (in this case the second diffraction part). If the first diffraction part has *negative* power, the light ray will be diverged away from the original light path, and as it incidents on the second diffraction part, depends on the angles of refraction and diffraction and the asymmetric shape of the first diffraction part and also depends on the curvature of the second diffraction part, the incident angle on the second diffraction part can be increased or decreased. The specification and the claims seem to fail to provide the **critical elements** or **criterions** to enable the layered diffraction optical member to enable the incident angle of a *off-axis primary ray* on the second diffraction part be reduced, as claimed. Furthermore, as demonstrated by the Figures 3 and 5, the light ray incidents on the first diffraction part **does not seem** to have incident angle between *plus and minus 6 degrees* which seems to be **part of criterions** for the claimed feature to be achieved.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1, 4, 7, 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Mukai et al (PN. 6,052,234) in view of the patent issued to Ishii (PN. 6,157,488).

Mukai et al teaches a *viewfinder optical system* having an objective optical system (tg, Figure 7) in *front* of **a** *pupil* (he) of *the optical system*, wherein the objective lens system comprises a double concave lens (g1), which is a *negative* lens, having a *diffractive* surface (s2) and a convex lens (g2), which is a *positive* lens, having a *diffractive* surface (s3), (please see Figure 7). Mukai et al teaches that the diffractive surface on the negative lens is having *negative power* and the diffractive surface on the positive lens is having *a positive power*, (please see column 6, lines 33-36), such that the first diffractive surface has a negative power and the second diffractive surface has a positive power. It is implicitly true that the second diffractive surface is *behind* the first diffractive surface since the incident light reaches the first diffractive surface first. The first diffractive surface will diverge the incident light toward the second diffractive surface as shown in Figure 7, the light incidents on the first lens at a non-zero incident angle will have its angle with respect to normal **reduced** by the first diffractive surface. With regard to the features concerning the "layered diffraction optical member laminated with a plurality of diffraction parts", in light of the specification and the drawings 1B, 4B and 6B, it is understood that this phrase *means* that two diffraction parts are formed at *different* optical elements with the combination of the two elements serves as the "layered diffraction optical *member*". With this interpretation, the objective lens

system having the negative lens with the negative power diffraction surface and the positive lens with the positive power diffraction surface is considered to be the "layered diffraction optical *member*", wherein the diffraction surfaces are *laminated* on the lens elements. As demonstrated by Figure 7, an image is formed on the image plane as the light passes through the layered diffraction grating parts.

This reference has met all the limitations of the claims with the exception that Mukai et al does not teach explicitly that the two diffractive optical elements are made with materials of different wavelength *dispersion property*. However Mukai et al does teach explicitly that by designing the diffractive optical surfaces or the diffraction grating parts having a ratio of the optical power to the Abbe number of the diffraction grating cancel the ratio for the refractive optical element, the diffraction grating parts can reduce the aberrations introduced by the refractive optical elements. This means the dispersion properties of the first and second diffraction parts can be designed to achieve such, (please see columns 7-8). **Ishii** in the same field of endeavor teaches a diffractive optical element having layered diffractive surfaces or parts that also has refractive power (please see Figures 22 and 23), wherein the diffractive surfaces are formed by using optical materials with different *dispersion* properties, (please se column 13, lines 33-54) in order to *achieve achromatic condition*, (i.e. reduce or eliminating the chromatic aberrations in the lens system). It would then have been obvious to one skilled in the art to apply the teachings of **Ishii** to modify the optical system of **Mukai** et al for the benefit of providing a design for the diffractive surfaces to more effectively achieve the achromatic condition and to reduce the aberrations given rise by the optical elements in the system.

With regard to the feature concerning that the optical system is an imaging optical system, Mukai et al teaches that the real image viewfinder optical system can be used in a camera, which is an imaging optical system, (please see column 1).

With regard to the feature that the first diffraction part reduces the incident angle of the principle ray as it incidents on the second diffraction part, the feature is rejected under 35 USC 112, first paragraph,

for the reasons stated above. Nevertheless, as demonstrated by **Mukai** et al in Figure 7, the off axis light ray passes through first diffractive part (S2) is *diverged* toward the second diffraction part wherein the incident angle of the light ray is reduced by the first diffraction part, (please see the most diverged light ray in the off axis position).

The lens system is designed to be a viewfinder that implicitly implied to be operated in the visible wavelength range. With regard to claim 4, Mukai et al teaches that an air space separation is between the two diffractive optical elements, (pleas see Figure 7). With regard to claim 7, Mukai et al teaches that the optical system further comprises other lens groups, which serve as the refractive optical devices.

With regard to claim 17, Mukai et al does not teach explicitly that the diffractive surfaces are of blaze shapes. However diffractive lens having blaze shape is very well known in the art as demonstrated by the teachings of **Ishii** (Figure 6). Ishii also teaches that the orientation of the blaze shape may be opposite to each other, (please see Figure 31). It would then have been obvious to one skilled in the art to modify the diffractive surfaces of Mukai et al in accordance with the teachings of Ishii for the benefit of providing the diffractive surfaces with high diffraction efficiency.

With regard to claim 19, as shown in Figure 7 of Mukai et al, there is no lens present on the object side of the objective optical system (tg).

With regard to claim 20, as shown in Figure 10, there is refractive optical element on the image side of the pupil.

Response to Arguments

10. Applicant's arguments filed on September 3, 2004 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and they are rejected for the reasons stated above.

11. In response to applicant's arguments concerning the "pupil" of the cited Mukai et al reference, the applicant is respectfully reminded that Mukai et al teaches **explicitly** that the pupil of **the optical system**

is at position (he, Figure 7), (Pleases see column 12, lines 43-44). This makes the disclosure reads on the limitations "said layered diffraction optical member is provided in front of *a pupil of the imaging optical system*" as recited in claim 1. In response to applicant's arguments that the pupil "he" is not a pupil for the **objective** optical system, the examiner respectfully disagrees for the reasons stated below. Firstly, the claim recites "a pupil of the image optical system" **does not** limit to the **objective optical system,** as the applicant's arguments are based upon. The pupil "he" certainly is **a pupil for the imaging optical system, (the whole system).** Secondly even if the pupil is referred to the "objective lens system "tg"" then as demonstrated by the Figures 7, wherein the objective lens system includes lens elements g1, g2 and g3, the exit pupil as seen from the image side should be in front of the objective lens group and the entrance pupil as seen from the object side should be after the lens (g2). The pupil of the objective lens system cannot be between the lens elements g1 and g2, since from the ray tracing the incident image light is **expanded** beyond the limit of the lens size of g2 after leaving the lens g2.

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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